USER'S MANUAL

PL 2051

ILLKO

CONTENTS

1. INTRODUCTION....2
1.1. Safety....2
1.2. Applied standards....3
1.3. General description....3
2. DESCRIPTION OF THE INSTRUMENT....4
2.1. Front panel....4
2.2. Included in the set....4
3. START-UP....4
3.1. Connecting the PL 2051 to the ESC 2051 or REVEXplus....4
4. MEASUREMENTS....5
4.1. Leakage current according to fig. 3/EN 62353....5
4.2. Leakage current according to fig. 8/EN 62353....7
4.3. Leakage current according to fig. 4/EN 62353....8
4.4. Leakage current according to fig. 7/EN 62353....9
5. CALIBRATION AND SERVICE....10
5.1. Calibration....10
5.2. Service....10
6. TECHNICAL SPECIFICATION....11

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1. INTRODUCTION

1.1. Safety

Read this instruction manual carefully and completely and follow all instructions contained therein. Otherwise using of the instrument may be dangerous for the operator, for equipment under test or for the instrument!

Observe the following safety precautions:

- Make sure that the instrument, measuring cables and all other accessories are in flawless condition, e.g. no damaged insulation, no broken cables or plugs etc.
- The PL 2051 is determined for measurement in conjunction with the measuring instrument ESC 2051 or REVEXplus! Connect the PL 2051 to the Test socket of the measuring instrument. It is prohibited to connect the PL 2051 directly to mains outlet or to a Test socket of any other instrument!
- Only a trained, skilled person, who is familiar with hazardous voltage operations, can handle the PL 2051. Unexpected hazardous voltages can occur at appliance under test (dangerously charged capacitors etc.).
- If referred to operation of the ESC 2051 or REVEXplus, all relevant safety precautions and other information must be observed – see the ESC 2051 or REVEXplus User's Manual! The user of the PL 2051 must be familiar with the operation of the ESC 2051 or REVEXplus!
- Device under test (DUT) connected to the Test Socket can be powered by mains voltage during some tests. The DUT can thus be activated.
- It is necessary to respect all safety regulations applicable to particular measurement.

The PL 2051 must not be used:

- If it no longer functions properly.
- If the PL 2051, the ESC 2051or REVEXplus , cables, connectors, plugs or other accessories are damaged.
- After extraordinary stresses (due to transport, unsuitable storage conditions etc.).

Explanation of symbols

Warning concerning a point of danger! Read User's Manual and observe all precautions!

Protection class (double insulation).

Hint, notice.

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Notices:

- The test socket 1 of the PL 2051 must not be used for continuous power supply of appliance. It is intended for test purposes only; max. test duration is 30 min. @ 12A.
- For cleaning of the instrument's surface use soft cloth, slightly moistened with lukewarm soap water. Disconnect all cables connected from the PL 2051 and disconnect the PL 2051 from the Test socket of the PL 2051 before cleaning. Do not spill cleaning liquid over the instrument! Do not use cleaning liquids based on petrol, hydrocarbons etc. After cleaning wait until the instrument becomes totally dry before using it!
- Unauthorized persons are not allowed to open the PL 2051! There are no replaceable components inside the instrument!

1.2. Applied standards

* Safety ..... EN 61010-1
* EMC …..... EN 55 022
EN 61000-4-2
EN 61000-4-3
EN 61000-4-4
EN 61000-4-5
EN 61000-4-6
EN 61000-4-11
* Measurement ..... EN 60601-1
EN 62353

1.3. General description

The PL 2051 in conjunction with the measuring instrument ESC 2051 or REVEXplus (USB) measures following leakage currents:

- According to fig. 3/EN 62353
- According to fig. 4/EN 62353
- According to fig. 7/EN 62353
- According to fig. 8/EN 62353

The results of measurements are displayed in LED display.
The measurement methods can be selected by rotary function switch.

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2. DESCRIPTION OF THE INSTRUMENT

2.1. Front panel

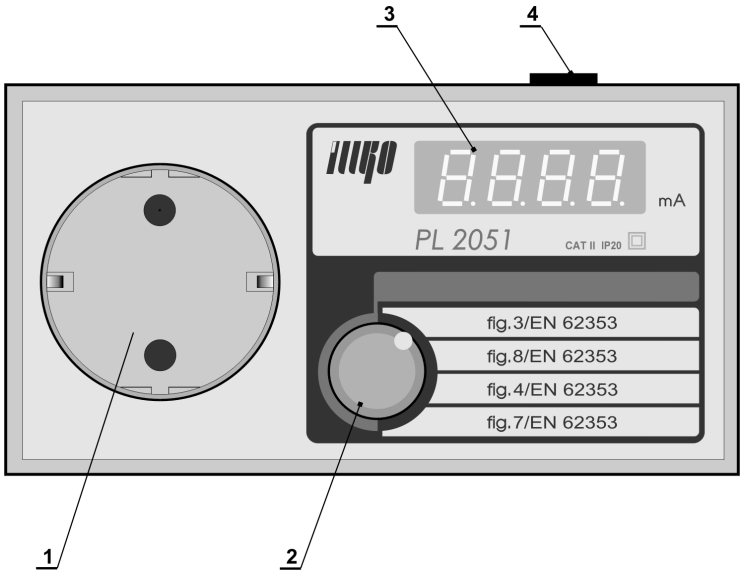

Fig. 1

Legend:

1 Test socket 230V / 12A
2 Rotary switch
3 LED display
4 Patient terminal

2.2. Included in the set

- PL 2051
- Calibration certificate
- Instruction manual

3. START-UP

3.1. Connecting the PL 2051 to the ESC 2051 or REVEXplus

The PL 2051 is determined for measurement in conjunction with the measuring instrument ESC 2051 or REVEXplus only!

- Connect the PL 2051 to mains outlet. Observe all precautions related to the PL 2051 mains connecting (see the ESC 2051 or REVEXplus User's Manual).
- Connect the PL 2051 to the Test socket of the ESC 2051 or REVEXplus.

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- Select I_{PE} function on the ESC 2051 or REVEXplus. Press the **START** key on the ESC 2051 or REVEXplus and keep it pressed. LED display on the PL 2051 lights on and value 0,000 ÷ 0,003 mA is displayed as long as the **START** key is pressed.

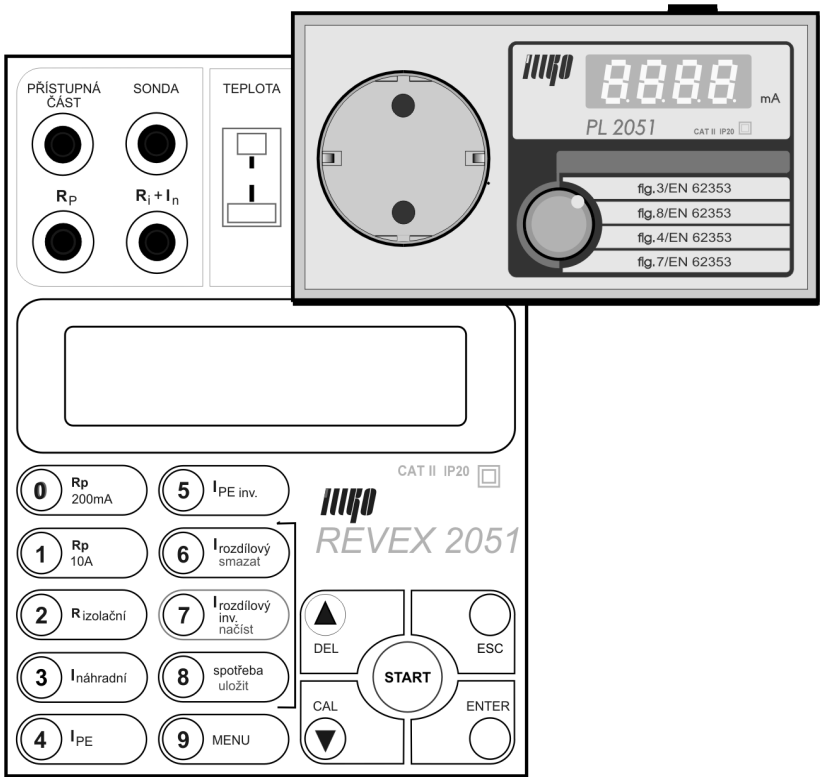

Fig. 2

4. MEASUREMENTS

4.1. Leakage current according to fig. 3/EN 62353

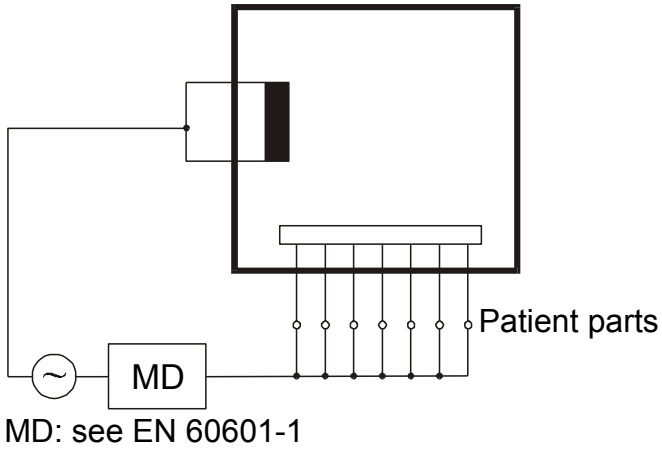

Fig. 3

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Power supply is connected between the patient parts, which are short-circuited and the short-circuited mains terminals of the DUT. The current flowing in the circuit is measured. The DUT is not activated. The short circuit of the mains terminals carries out the PL 2051.
This measuring method is suitable for testing of such DUTs, which have no electrically/electronically controlled switching element. If mentioned switching element is in the DUT, in fact only the circuitry placed before the switching element is tested (see Fig. 4).

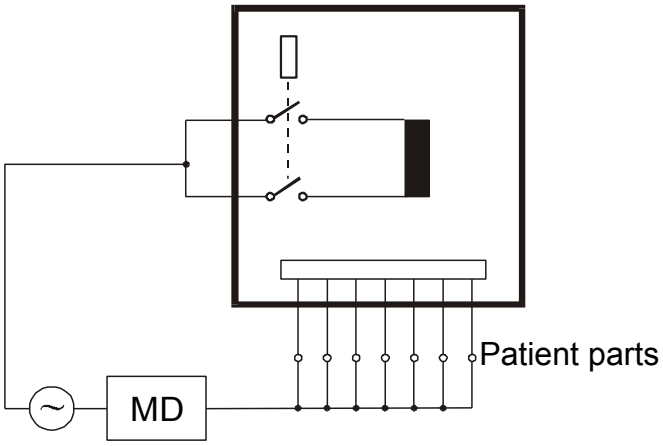

Fig. 4

Test voltage is 230 V / 50 Hz, short circuit current < 3,5 mA.

Step 1

- Connect mains cable of the ESC 2051 or REVEXplus to grounded mains outlet 230 V.
- Connect mains plug of the PL 2051 to the Test socket of the ESC 2051or REVEXplus .
- Connect mains plug of the DUT to the Test socket of the PL 2051.
- Connect patient parts of the DUT with Patient terminal of the PL 2051 by the P 2030 cable.

Step 2

- Switch on the mains switch of the DUT.
- Select fig. 3/ EN 62353 function by the PL 2051 rotary switch.
- Select I_{PE} function on the ESC 2051or REVEXplus .

Do not touch exposed conductive parts of the DUT while measurement is in progress - risk of electric shock!

- Press the **START** key and keep it pressed. You can also lock the **START** key; proceed as follows: Press the ▲ key and keep it pressed. Press the **START** key. Release both keys. Both keys are on the ESC 2051.
- The measurement of leakage current is in progress. The measured value is displayed on the PL 2051 LED display (reading on the ESC 2051 or REVEXplus display has no meaning; the measured value is not written to the ESC 2051 memory).
- The measurement is finished after the **START** key is released or locking is cancelled (by pressing of the ▲ key). The LED display is turned off.
- Switch off the mains switch of the DUT.

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4.2. Leakage current according to fig. 8/EN 62353

Power supply is connected between the patient parts, which are short-circuited and exposed conductive parts of the DUT. The current flowing in the circuit is measured. The DUT is not activated.
This measuring method is suitable for testing of such DUTs, which have no electrically/electronically controlled switching element. If mentioned switching element is in the DUT, in fact only the circuitry placed before the switching element is tested.

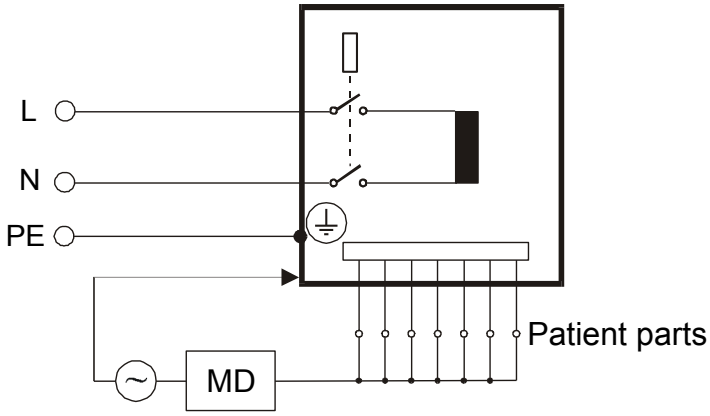

Fig. 5

Test voltage is 230 V, short circuit current < 3,5 mA.

Step 1
- Connect mains cable of the ESC 2051 or REVEXplus to grounded mains outlet 230 V.
- Connect mains plug of the PL 2051 to the Test socket of the ESC 2051or REVEXplus .
- Connect mains plug of the DUT to the Test socket of the PL 2051.
- Connect patient parts of the DUT with Patient terminal of the PL 2051 by the P 2030 cable.

Step 2
- Switch on the mains switch of the DUT.
- Select fig. 8/EN 62353 function by the PL 2051 rotary switch.
- Select $\mathbf{I_{PE}}$ function on the ESC 2051 or REVEXplus .

Do not touch exposed conductive parts of the DUT while measurement is in progress - risk of electric shock!

- Press the **START** key and keep it pressed. You can also lock the **START** key; proceed as follows: Press the ▲ key and keep it pressed. Press the **START** key. Release both keys. Both keys are on the ESC 2051.
- The measurement of leakage current is in progress. The measured value is displayed on the PL 2051 or REVEXplus display (reading on the ESC 2051 LCD has no meaning; the measured value is not written to the ESC 2051 memory).
- The measurement is finished after the **START** key is released or locking is cancelled (by pressing of the ▲ key). The LED display is turned off.

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- Switch off the mains switch of the DUT.

4.3. Leakage current according to fig. 4/EN 62353

The leakage current between exposed conductive parts and patient parts of the DUT is measured. The DUT is activated during measurement!
This measuring method is suitable for testing of such DUTs, which have electrically/electronically controlled switching element and thus it is important to test it in its operating conditions.

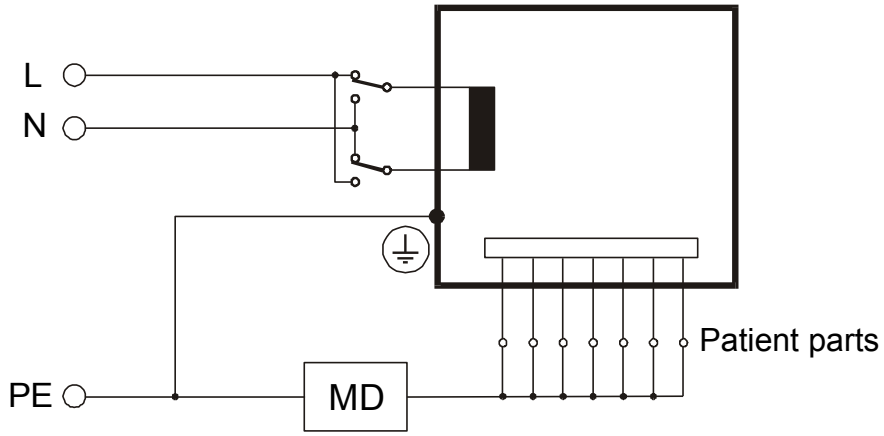

Fig. 6

- **Firstly test earth bond and also insulation resistance (if it is possible). Then you can execute leakage current measurement.**
- **Equipment under test must be isolated from ground (from the earth potential) during measurement!**

Step 1
- Connect mains cable of the ESC 2051 or REVEXplus to grounded mains outlet 230 V.
- Connect mains plug of the PL 2051 to the Test socket of the ESC 2051or REVEXplus .
- Connect mains plug of the DUT to the Test socket of the PL 2051.
- Connect patient parts of the DUT with Patient terminal of the PL 2051 by the P 2030 cable.

Step 2
- Select fig. 4/ EN 62353 function by the PL 2051 rotary switch.
- Select $\mathbf{I_{PE}}$ function on the ESC 2051 or REVEXplus.

- **Do not touch exposed conductive parts of the DUT while measurement is in progress - risk of electric shock!**
- **The DUT is activated during measurement! Take into consideration all safety warnings, referred to the DUT!**

- Press the **START** key and keep it pressed. You can also lock the **START** key; proceed as follows: Press the ▲ key and keep it pressed. Press the **START** key. Release both keys. Both keys are on the ESC 2051.

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- Switch on the mains switch of the DUT.
- The measurement of leakage current is in progress. The measured value is displayed on the PL 2051 LED display (reading on the ESC 2051 or REVEXplus display has no meaning; the measured value is not written to the ESC 2051 memory).
- Switch off the mains switch of the DUT.
- Release the **START** key or cancel the locking (by pressing of the ▲ key). The LED display is turned off.
- Repeat the measurement with interchanged L-N mains terminals of the DUT: select $I_{PE\ INV}$ function on the ESC 2051 or REVEXplus and repeat the measurement described in Step 2.

Reconnect all ground connections, which was disconnected before the measurement was accomplished.

4.4. Leakage current according to fig. 7/EN 62353

The leakage current between exposed conductive parts and patient parts of the DUT is measured. The test voltage is generated by an auxiliary power supply 230 V. The DUT is activated during measurement!
This measuring method is suitable for testing of such DUTs, which have electrically/electronically controlled switching element and thus it is important to test it in its operating conditions.

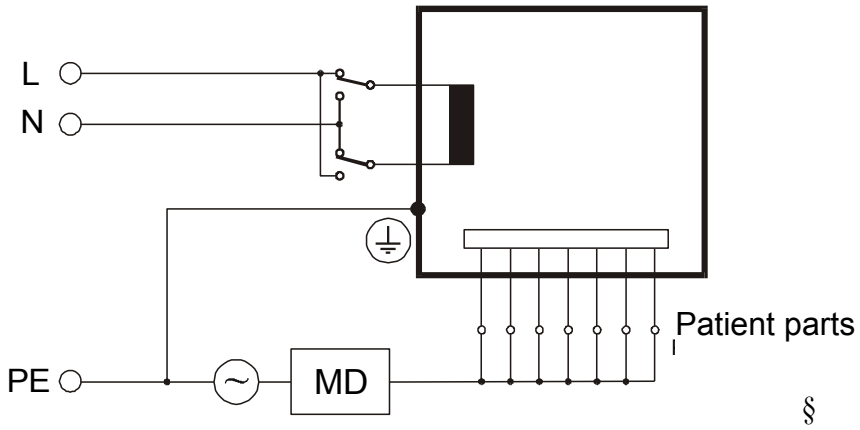

Fig. 7

Test voltage is 230 V /, short circuit current < 3,5 mA.

Step 1
- Connect mains cable of the ESC 2051 or REVEXplus to grounded mains outlet 230 V.
- Connect mains plug of the PL 2051 to the Test socket of the ESC 2051or REVEXplus .
- Connect mains plug of the DUT to the Test socket of the PL 2051.
- Connect patient parts of the DUT with Patient terminal of the PL 2051 by the P 2030 cable.

Step 2
- Select fig. 7/EN 62353 function by the PL 2051 rotary switch.

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- Select I_{PE} function on the ESC 2051or REVEXplus .

- **Do not touch exposed conductive parts of the DUT while measurement is in progress - risk of electric shock!**
- **The DUT is activated during measurement! Take into consideration all safety warnings, referred to the DUT!**

- Press the **START** key and keep it pressed. You can also lock the **START** key; proceed as follows: Press the ▲ key and keep it pressed. Press the **START** key. Release both keys. Both keys are on the ESC 2051.
- Switch on the mains switch of the DUT.
- The measurement of leakage current is in progress. The measured value is displayed on the PL 2051 LED display (reading on the ESC 2051 or REVEXplus display has no meaning; the measured value is not written to the ESC 2051 memory).
- Switch off the mains switch of the DUT.
- Release the **START** key or cancel the locking (by pressing of the ▲ key). The LED display is turned off.
- Repeat the measurement with interchanged L-N mains terminals of the DUT: select $I_{PE\ INV}$ function on the ESC 2051or REVEXplus and repeat the measurement described in Step 2.

5. CALIBRATION AND SERVICE

5.1. Calibration

All measurement instruments should be regularly calibrated. We recommend interval of calibration 2 years.
Furthermore we recommend to carry out calibration after each repair.

5.2. Service

Contact your local distributor for further information.

Unauthorized persons are not allowed to open the PL 2051!
There are no replaceable components inside the instrument!

5.3. Ecology

Transportation packing
It is made of corrugated board; it is recyclable.

Instrument

This symbol signifies that the product should not be thrown away to municipal waste at end-of-life.
Please dispose of this product according to the relevant statutory requirements.

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http://www.illko.cz

6. TECHNICAL SPECIFICATION

Protective class .....II (double insulation)
Over voltage class.....CAT II
Pollution degree.....2
Degree of protection.....IP 20
Reference conditions:
line voltage.....230 V ± 1 % / 50 ÷ 60 Hz
ambient temperature.....(23 ± 2) °C
humidity.....45 ÷ 55 % RH @ 23 °C
position.....arbitrary
Operating condition:
line voltage....230 V ± 10 % / 50 ÷ 60 Hz
ambient temperature.....0 °C ÷ 40 °C
humidity.....max. 75 % RH @ 23 °C
(condensation not allowed)
Max. altitude of using PL 2051 ... 2 000m
IK rating 07
Impact Energy..... 2J
Max. current.....12 A / 30 min.
(it depends on tested equipment)
Quiescent current.....circa 50 mA
Dimension (w x d x h).....125 x 70 x 95 mm
Mass.....0,5 kg
Storage temperature/humidity range.....
..... -10 ° ÷ 50 °C / max. 75 % RH
Case resistance to temperature.....70 °C

Measuring range	0.000 ÷ 1,999 mA
Resolution	0.001 mA
Sensing	True RMS
Test voltage	230 V ± 15 %
Short circuit current	< 3,5 mA
Intrinsic (reference) error	±(4 % R + 4 D)
Operating error	±(5 % R + 5 D)

Note:
R - Reading
D - Digit

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